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Esther Burkitt[1], Martyn Barrett[2] and Alyson Davis[3]

[1] Department of Psychology

University of Portsmouth

UK

[2 & 3] Department of Psychology

University of Surrey

UK

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Address for correspondence: Dr Esther Burkitt, Department of Psychology, University of Portsmouth, King Henry Building, King Henry 1 Street, Portsmouth PO1 2DY; telephone: 023 9284 8484; fax: 023 9284 6300, email: esther.burkitt@port.ac.uk

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Abstract

Previous research has yielded conflicting findings about the existence and the direction of the size changes which occur in children's drawings when they are asked to draw topics which have been given an affective characterisation. The present study was designed to investigate whether children scale up the size of drawings of topics which have been given a positive characterisation, and scale down the size of drawings of topics which have been given a negative characterisation. Two hundred and fifty-eight children aged between 4 and 11 years completed three drawings of either a man, a dog or a tree. Each child drew a baseline drawing of a neutrally characterised figure, and two further drawings of a positively and a negatively characterised version of the same figure. It was found that the children drew the positively characterised topics larger than the neutrally characterised topics, and reduced the size of the negatively characterised topics relative to the baseline drawings. These patterns occurred at all ages and with all three drawing topics. Two possible explanations of the findings are discussed: the operation of an appetitive-defensive mechanism in children, and the acquisition of pictorial conventions.

Introduction

Most research on children's drawings has focused on the internal structure and visual realism of children's graphic depictions (e.g. Barrett, Beaumont & Jennett, 1985; Barrett & Light, 1976; Bremner & Moore, 1984; Cox, 1985, 1992; Davis, 1983, 1985; Freeman, 1980; Goodnow, 1977; Kellogg, 1969; Light & McEwan, 1987; Sitton & Light, 1992; Winner, 1982) and on the perceptual, cognitive and motor processes involved in producing a drawing (Cox, 1992; Freeman, 1980, 1987; Goodnow, 1977). However, some researchers have also explored whether the contents of children's drawings can be used as a reliable index of children's feelings concerning the objects depicted in their drawings (Forrest & Thomas, 1991; Hammer, 1997; Joiner, Schmidt & Barnett, 1996; Jolley, 1995; Jolley & Vulic-Prtoric, 2001; Koppitz, 1968, 1969; Thomas, Chaigne & Fox, 1989). Located within the latter tradition, the present experiment was designed to assess whether the size of depicted objects in children's drawings might be influenced by the affective characterisations which have been given to those objects.

This is an important issue to study for two main reasons. Firstly, the existing research literature on children's drawings is littered with conflicting results concerning whether or not the size of the depicted objects in children's drawings can be reliably interpreted as an index of children's feelings towards the objects being depicted (cf. the conclusions drawn by Craddick, 1961, 1963; Di Leo, 1973; Hammer, 1997; Jolley, 1995; Koppitz, 1968, 1969; Sechrest & Wallace, 1964; Solley & Haigh, 1957; Thomas et al, 1989; Thomas & Jolley, 1998). It is our contention that much of this confusion in the research literature stems from a failure to utilise appropriate research methods for investigating this issue, and that through the use of appropriate methods, it should be possible to clarify whether size is or is not used by children in order to differentiate their drawings of objects which have differential emotional salience. Secondly, it is important to obtain a proper understanding of this

phenomenon because of its potential applications. Children's drawings are often interpreted for personal meaning in clinical and educational settings (see, for example, Di Leo, 1973; Hammer, 1997), with interpretations of the emotional significance of the contents of children's drawings (which may have implications for the treatment of those children) being made in such settings in the absence of an adequate research evidence base for those interpretations.

Previous research has yielded conflicting findings concerning both the direction and the magnitude of possible size changes in children's drawings following affective characterisations of drawing topics. There are several studies suggesting that children increase the size of attractive or positive topics (e.g. Aronsson & Andersson, 1996; Cleeve & Bradbury, 1992; Craddick, 1961; Di Leo, 1973; Hulse, 1951; Sechrest & Wallace, 1964; Solley & Haigh, 1957) and decrease the size of unattractive or threatening topics (Craddick, 1963; Koppitz, 1968, 1969). However, Freeman (1976), Cox (1992), Jolley (1995) and Thomas & Jolley (1998) have all criticised this line of research for a general failure to take into account the cognitive and perceptual-motor difficulties which children have in planning and producing drawings, for an over-reliance upon the use of *ad hoc* selections of drawings as evidence, for a failure to utilise proper experimental designs with appropriate controls to test the claims which are made concerning the effects of affective characterisations upon the size of children's drawings, and for a failure to obtain independent validations or measures of the affect which is supposed to be associated with a given drawing topic. Moreover, these critics note that the increase in the size of drawings found in certain studies (Craddick, 1961; Sechrest & Wallace, 1964; Solley & Haigh, 1957) may merely be a consequence of increased detail inclusion (Freeman, 1980; Henderson & Thomas, 1990). The general conclusion that affect does not impact upon the size of children's drawings has been further reinforced by the findings of two more recent studies which have examined depressed patients' drawings

(Joiner, Schmidt & Barnett (1996) and Croatian children's drawings of enemy soldiers and of friends (Jolley & Vulic-Prtoric, 2001), that is, drawings where strong negative or positive affect might be expected to be present: both studies failed to uncover any reliable changes in size between drawings of positive and negative figures. In the light of their evaluation of the existing evidence, Jolley (1995) and Thomas & Jolley (1998) argue that there is no strong evidence in the existing literature to support the claim that children either reduce the size of threatening topics or increase the size of attractive topics. Instead, they argue that all of the evidence to the contrary has merely shown that such effects are weak, unreliable and hard to obtain under experimental conditions.

It is clearly crucial for studies in this area either to manipulate directly, and/or to measure independently, the affect which is associated with the topic being drawn, and to control for the amount of detail which is included in the drawing, in order to assess the claims which are made concerning the impact of affective characterisation upon the size of graphic depictions. The debate thus focuses upon the methodological adequacy of the studies which have been conducted in this area (for example, it is noteworthy that neither Joiner at al., 1996, nor Jolley & Vulic-Prtoric, 2001, measured affect towards the drawn topics at the time of drawing).

One study in the literature which avoids many of the problems of earlier research, by using much tighter experimental control of a number of factors, was conducted by Thomas et al. (1989). They used a shaded outline model of a human figure for 4-7 year old children to copy, in order to control for planning and production problems, and to eliminate possible increases in size due to the anticipation of detail inclusion. They also provided children with separate sheets of paper for the drawing of affectively characterised and neutrally characterised topics. This procedure was used because it has been found that if a significant figure is drawn first, insufficient space may be left on the piece of paper for the depiction of a

second figure, leading to size differences which may be due to planning difficulties (Henderson & Thomas, 1990; Thomas & Tsalami, 1988; Thomas & Gray, 1992) rather than differential topic significance. Thomas et al. also included a control group. This group was asked to draw a second figure the same as the first, while the two experimental groups first produced an uncharacterised drawing, and then a second drawing after either a positive or a negative topic characterisation.

In their first experiment, Thomas et al. found that children decreased the size of human figures characterised as nasty, and non-reliably increased the size of human figures characterised as nice. In their second experiment, they assessed the generalisability of these findings by asking 4-6 year olds to draw an apple placed in front of them which they were told was magic, and was thus capable of being either nice or nasty. It was found that children drew apples characterised as nice larger than the control group, and apples characterised as nasty non-reliably smaller than the control group.

These results prompted Thomas et al. to propose an appetitive-defensive theory of the mechanisms influencing drawing behaviour. They argued that children increase the size of attractive figures, and reduce the size of potentially threatening figures, to achieve psychological affinity with, and distancing from, the topic. This account was largely prompted by the asymmetry in their findings. They proposed that children were not simply responding to a pictorial convention stating that nice figures are large and nasty figures are small because, whilst a nasty characterisation served to reduce the size of human figure drawings, it did not serve to reduce the height of nasty apple drawings to the same extent. Drawing upon the work of Hugdahl & Ohman (1977), Thomas et al. suggested that task instructions can elicit fear for certain types of stimuli such as snakes and spiders, but not for others such as geometric shapes. They argued that it is plausible to suppose that the nasty apple did not represent as much threat to the children as the nasty human, thus requiring less

psychological distancing from the topic to be translated into the drawings, resulting in less graphic minimisation. They also argued that an appetitive-defensive theory might account for the increase of the size of the nice apple, and the increase in the size (though not statistically significant) of the nice man.

While Thomas et al.'s research indicates that effects of topic significance on representational size may be assessed and measured using a more rigorous experimental methodology, their work is open to criticism. Firstly, their theory is motivated by the asymmetry in their findings between the two experiments. However, conditions were not held constant between the two experiments: in the first experiment, children were asked to draw from a two-dimensional schematic model, while children in the second experiment were requested to copy a three-dimensional real apple. Secondly, a between-subjects design was used. However, it is well-established that there is a large amount of variability in the size of children's spontaneous drawings (e.g. Hammer & Kaplan, 1964; Sechrest & Wallace, 1964). Consequently, the use of a between-subjects design is likely to have introduced a large amount of error variance to the data, which may have partially obscured the experimental effects. Thirdly, Thomas et al. did not include an independent measure of children's differential affect towards the topics, instead assuming that the characterisations conveyed differential significance to the children. Thus, although Thomas et al. provided some evidence for the existence of children's graphic flexibility when requested to draw differentially characterised topics, these various concerns raise questions about the study and its interpretation.

To explore further the suggestion that an appetitive-defensive mechanism might operate in children's drawings (as opposed to a production response based on a pictorial convention), Jolley (1995) also conducted a series of studies in which various experimental parameters (based on Thomas et al.'s first experiment) were varied in order to test the

presence of this mechanism. He also investigated children's perception of emotionally characterised topics. He found that children tended to perceive larger human figure outlines as representing nasty threatening attributes, and smaller human figure outlines as representing nice, attractive characteristics. However, through a sequence of 7 studies, he found no reliable evidence that children employed either size conventions or defence mechanisms (minimising unpleasant, maximising pleasant topic size) in their production of affectively characterised human figure drawings, with all effect sizes in his studies being small. Jolley argued that the non-significant results from the production tasks were due to the weakness of the appetitive and defensive mechanisms. However, Jolley employed a between-subjects design in the majority of his production tasks as well as relatively small samples (16 in each experimental group); thus, there was the possibility that error variance obscured the experimental effects.

It is therefore unclear whether Thomas et al.'s findings represent isolated occurrences, or whether children do employ different production strategies when drawing differentially characterised stimuli. It is possible that the suggested principles exert only a weak effect on children's drawings, effects which are therefore difficult to identify, particularly using small samples in between-subjects designs. The present experiment was designed to address these concerns.

One important design feature of the present study was taken directly from the work of Thomas et al. (1989). Shaded outline models were used to eliminate possible size changes due to the anticipation of detail inclusion. However, several other features of the original Thomas et al. experiment were altered. Control drawings were collected, but a repeated measures design was utilised, with each child producing three drawings: a baseline control drawing first, followed by drawings of a positively and a negatively characterised topic administered in counterbalanced order. This was intended to control for possible order effects

arising from the repeated-measures design and to enable within-subject comparison of potential scaling changes. It was judged that a repeated-measures design would give greater control over between-subject variation in the size used to depict the characterised stimuli, and would hence reduce error variance. As in Thomas et al.'s study, each drawing was completed on separate sheets of paper, to control for potential production and planning difficulties, and subsequent problems of interpretation.

Further design modifications to Thomas et al.'s paradigm entailed three different groups of children copying three different models (a man, a dog and a tree). This manipulation of model was included to assess the generalisability of the findings. The dog and tree were included to see whether the differences between size changes for human figures and apples in Thomas et al.'s study were due to an influence of topic animism, whereby children only increase the size of nice animate topics (men, dogs) and do not reduce nasty versions of inanimate topics (apples, trees), or whether size changes were due to an influence of drawing humans (men) versus non-humans (apples, dogs, trees). A pilot study (N=55, aged 4-11 years) showed that all children would be able to complete copies of the three models without including details and using a continuous contour strategy (Goodnow, 1977; Barrett & Eames, 1996).

Previous research addressing the potential relationship between children's affect toward a drawn topic and resulting graphic size has hitherto defined size solely as figure height. This is clearly a restricted definition of size, especially when children's motor and planning difficulties, and the non-linear form of the models employed, are taken into consideration. The present study used a broader definition of size, and included figure surface area, figure height and figure width.

In order to explore developmental trends, a larger age range was employed than in previous studies. This was to assess the possible presence or absence of effects in older

children (older than 7 years), who were not tested in either Thomas et al.'s or Jolley's experiments.

Although various researchers have included measures either of children's perception of potentially negative drawn topics (Fox & Thomas, 1990; Jolley, 1995), or potentially important and attractive drawn topics (Cleeve & Bradbury, 1992), no studies have measured both. Consequently, the present study employed a five-point smiley-face Likert scale (see Figure 1), which allowed the children to provide a neutral middle rating, or a positive rating of a negative topic, or a negative rating of a positive topic. Although this scale was unlikely to measure persistent affect over time, or to provide information about the children's underlying emotional attitudes toward the topics, it was judged that it would at least provide independent evidence as to whether the children did or did not rate the affectively characterised topics differently, and in the anticipated directions.

Importantly, a large sample of children was used (N = 258). Power calculations indicated that to detect a medium effect size (at an alpha level of 0.05, with 80% power), the minimum number of children in each cell of the design needed to be 20 (Cohen, 1988). The smallest cell size was therefore set at 24, above this minimum number. Finally, unlike previous research in this area, drawing ability was measured to assess whether the allocation of participants to cells in the design was at all biased on this factor.

Thus, this experiment was intended to investigate the conditions under which measurable size changes occur in children's drawings following task instructions providing neutral, positive and negative affective topic characterisations. The primary aim was to ascertain whether children would reliably increase the size of drawings from baseline control drawings following a positive affective characterisation, and would reliably reduce the size of nasty drawings compared with baseline drawings following a negative affective characterisation. In addition, the study aimed to ascertain whether topic animism or topic

humanism determines whether a drawing is or is not scaled up or down in size, according to affective characterisation.

The study also aimed to assess developmental trends and possible gender differences in representational size change following affective topic characterisation. Whilst previous work (Jolley, 1995; Thomas et al., 1989) has found no age-related size differences between children's drawings of nice and nasty topics, on the basis of research showing that children's drawings become smaller with age (see Cox, 1992, 1993), it was anticipated that older children would produce smaller drawings overall than younger children. Gender differences have not been explicitly investigated in this area, yet there is evidence to suggest that boys and girls differentiate human figures differently (e.g. Cox, 1992; Hammer, 1997; Koppitz, 1969; Levick, 1997; Sitton & Light, 1992). It was therefore of additional interest to explore whether boys and girls differentiated affectively characterised human figures differently through size.

Method

Participants

Two hundred and fifty-eight children were selected from mainstream primary schools in the county of Surrey, UK. They were selected randomly from school class lists. Firstly, three age groups were formed on the basis of year of schooling (youngest group: Reception, Years 1 and 2; middle group: Years 3 and 4; oldest group: Years 5 and 6). Children within each age group were assigned randomly to one of three experimental conditions involving the copying of different models: either a man (N = 86), a dog (N = 85), or a tree (N = 87). Full details of the sample are shown in Table 1. Within each subgroup, the children were further randomly divided into two for the order of task administration, with half the children receiving the nice instructions first, and the other half receiving the nasty instructions first.

INSERT TABLE 1 ABOUT HERE

Materials

Each child was given a pencil and a sheet of plain A4 paper presented in portrait orientation for each drawing. They were shown either a simple shaded outline drawing of a man, a dog, or a tree (depending upon condition), presented on a sheet of white A4 paper. Figure 2 shows the models. The man was 12.6 cms. high, 4.2 cms. wide, and had a surface area of 28.25 cm^2; the dog was 9.5 cms. high, 11.4 cms. wide, and had a surface area of 34.25 cm^2; and the tree was 11.1 cms. high, 7.4 cms. wide, and had a surface area of 41.25 cm^2. The five-point Likert scale shown in Figure 1 was also used.

INSERT FIGURES 1 AND 2 ABOUT HERE

Procedure

The children were tested individually in a quiet area in their school. Each child completed three drawings: a baseline neutrally characterised figure first, followed by a drawing of a positively characterised and a negatively characterised figure in counterbalanced order.

Baseline drawing task

The condition-appropriate model (i.e. the man, the dog or the tree) was placed in front of the child. The children drawing the man were instructed as follows: *"I'd like you to draw this shape. Draw the whole man as well as you can. Do not include any details such as the face or the clothes."* The children drawing the dog received the following instruction: *"I'd*

like you to draw this shape. Draw the whole dog as well as you can. Do not include any details such as the hair or claws". Children copying the tree were given the following instructions: *"I'd like you to draw this shape. Draw the whole tree as well as you can. Do not include any details such as the leaves or flowers."*

Nice and nasty drawing tasks

The baseline drawing was removed from the child's sight, and the model was left in place for the remainder of the test situation. All the children then drew two further copies of the model, a nice and a nasty version in counterbalanced order, on separate sheets of plain A4 paper. The second drawing was always removed from the child's sight before the third drawing was produced.

The instructions for the nice man were as follows: *"Now pretend that the shape is of a very nice kind man who is very pleasant and friendly to everyone. Draw the shape in front of you, remembering what a nice person he is. Draw the whole man as well as you can, but do not include any details such as the face or clothes."* The instructions for the nasty man were: *"Now pretend that the shape is of a very nasty horrible man who is very mean and unfriendly to everyone. Draw the shape in front of you, remembering what a nasty man he is. Draw the whole man as well as you can, but do not include any details such as the face or clothes."* The instructions for the nice dog were: *"Now pretend that the shape is of a very nice kind dog, which is very pleasant and friendly with everyone. Draw the shape in front of you, remembering what a nice dog it is. Draw the whole dog as well as you can, but do not include any details such as the hair or claws."* The instructions for the nasty dog were: *"Now pretend that the shape is of a very nasty horrible dog, which is very mean and unfriendly, and barks at everyone. Draw the shape in front of you, remembering what a nasty dog it is. Draw the whole dog as well as you can, but do not include any details such as the hair or claws."*

The instructions for the nice tree were: *"Now pretend that the shape is of a very nice lovely tree, which everyone likes looking at and which is very pleasant. Draw the shape in front of you, remembering what a nice tree it is. Draw the whole tree as well as you can, but do not include any details such as the leaves or flowers".* The instructions for the nasty tree were: *"Now pretend that the shape is of a very nasty horrible tree, which everyone hates looking at and which is very unpleasant. Draw the shape in front of you, remembering what a nasty tree it is. Draw the whole tree as well as you can, but do not include any details such as the leaves or flowers."*

Affect rating tasks

Immediately after completing the drawing of a characterised topic, the drawing was left in view and the child was asked to rate their affect towards the topic using the smiley-face scale (see Figure 1). The instructions for both the characterised topics were: *"I would like to find out how you feel about the (man/dog/tree). What I'd like you to do is point to the face to show how you feel about the (man/dog/tree). Here are the faces that you are going to be looking at* (pointing to each face in turn)*. The first one is a very unhappy face; the next one is quite an unhappy face; the middle one is neither happy nor unhappy. The fourth face is quite a happy face and the last one is a very happy face. I'd like you to point to the face that describes how you feel about the (man/dog/tree). OK?"* The children's responses were recorded for the nice and nasty topics, and scored on a scale from 1 (*very unhappy*) to 5 (*very happy*).

Drawing ability

On the day of testing, class teachers were asked to rate each class member's drawing ability by means of the following written instructions: *"Thinking of a typical Year {year*

group of child}, please rate {child's name} drawing ability on the following scale: poor (1), below average (2), average (3), above average (4), good (5).

Measurements

All children refrained from including details in their drawings. The height of each drawing was measured as the vertical distance from the highest to the lowest extremity of the figure (this was the procedure used by Thomas et al., 1989, and Jolley, 1995). Width was measured as the horizontal distance between the furthest left and furthest right extremities of the figure. Surface area was measured using a grid of 0.5 cm. squares. Squares with over 50% covered were counted, and squares with less than 50% covered were excluded. A second rater measured the surface area of 20% of the drawings from each age group, and a 94% inter-judge reliability to the nearest cm^2 was obtained. Surface area measurements of the drawings under contention were recounted by both judges until consensus was obtained and were included in the analyses.

Results

Due to the lack of homogeneity of variance, and the presence of skewed distributions in some of the cells in the design, the surface area, height and width measurements were transformed using a LOG 10 transformation prior to analysis. The data were then screened for potential effects involving the order of presentation of the characterised drawing tasks. No main or interaction effects involving order of presentation on any the variables were found, and this factor was therefore excluded from further analysis.

Surface Area

The transformed surface area scores were analysed using a 3 (age group) x 2 (sex) x 3 (condition: man vs. dog vs. tree) x 3 (drawing type: baseline vs. nice vs. nasty) four-way mixed ANOVA, with repeated measures on drawing type and independent groups on the other three factors. A main effect of drawing type was found ($F (2, 480) = 34.23$, $p = 0.001$). The effect size was large with high observed power (partial eta $^2 = 0.13$, $P = 1.00$). Simple planned contrasts revealed that the nice drawings were larger than the baseline drawings ($p < 0.001$) and that the nasty drawings were smaller than the baseline drawings ($p = 0.002$), indicating that the nasty drawings were also significantly smaller than the nice drawings. The relevant transformed and untransformed means are shown in Table 2. A main effect of condition was also found ($F (2, 240) = 9.21$, $p = 0.01$), with a medium effect size and high power (partial eta $^2 = 0.07$, $P = 0.98$). *Post hoc* Tukey tests showed that the drawings of the trees (transformed data: $M = 1.96$, $SD = 0.27$; untransformed data: $M = 34.63$, $SD = 33.09$) were significantly larger than the drawings of both the man (transformed data: $M = 1.72$, $SD = 0.37$; untransformed data: $M = 19.60$, $SD = 19.04$) ($p < 0.001$) and the dog (transformed data: $M = 1.81$, $SD = 0.36$; untransformed data: $M = 24.78$, $SD = 29.94$) ($p = 0.001$).

A main effect of age group was found ($F (2, 240) = 4.82$, $p = 0.05$), showing a large effect size with moderately high power (partial eta $^2 = 0.39$, $P = 0.80$). *Post hoc* Tukey tests showed that the oldest group (transformed data: $M = 1.91$, $SD = 0.28$; untransformed data: $M = 26.22$, $SD = 15.83$) drew larger drawings overall than the youngest group (transformed data: $M = 1.76$, $SD = 0.44$; untransformed data: $M = 22.01$, $SD = 13.64$) ($p = 0.007$), yet the middle age group did not produce drawings significantly larger or smaller than the other two groups.

The main effect of drawing type was qualified by an interaction between sex and drawing type ($F (2, 480) = 4.92$, $p = 0.002$), which was a small effect size with moderately high power (partial eta $^2 = 0.02$, $P = 0.80$). *Post hoc* one-way ANOVA examining boys and

girls drawings types separately revealed that both boys and girls drew larger nice than baseline drawings and reduced the surface area of the nasty drawings from baseline drawing size. *Post hoc* independent t-tests located the interaction, showing that the boys tended to draw larger nice drawings than the girls ($p < 0.05$), but did not draw larger baseline or nasty drawings than the girls (see Table 2). No further significant main or interaction effects were found for surface area.

INSERT TABLE 2 ABOUT HERE

INSERT FIGURE 3 ABOUT HERE

The frequency of children's tendency to increase the size of the nice drawing from baseline size was calculated, as was the frequency of their tendency to decrease nasty drawing size from baseline size. It was found that 64% (N = 166) of the children increased the size of the nice drawings relative to baseline, whilst 57% decreased the size of the nasty drawings relative to baseline (N = 148). 70.1% of the boys (N = 94) increased the size of their nice drawings from baseline drawing size, whereas only 58.1% of the girls (N = 72) did so.

Height

The transformed height of the drawings was also analysed using a 3 (age group) x 2 (sex) x 3 (condition) x 3 (drawing type) four-way mixed ANOVA, with repeated measures on drawing type and independent groups on the other three factors. A main effect of drawing type was found ($F (2, 480) = 28.30$, $p < 0.001$). The effect size was medium, with high power (partial eta $^2 = 0.11$, $P = 1.00$). Simple planned contrasts showed that nice drawings (transformed data: $M = 0.89$, $SD = 0.22$; untransformed data: $M = 8.86$, $SD = 4.57$) were

taller than baseline drawings (transformed data: M = 0.84, SD = 0.19; untransformed data: M = 7.57, SD = 3.20) ($p < 0.001$), and that nasty drawings (transformed data: M = 0.80, SD = 0.23; untransformed data: M = 7.18, SD = 3.76) were smaller than baseline drawings ($p = 0.001$), indicating that the nasty drawings were smaller than the nice drawings.

A second main effect was found for age group ($F (2, 240) = 4.23$, $p = 0.016$; partial eta $^2 = 0.03$, $P = 0.74$), with *post hoc* Tukey tests ($p = 0.008$) showing that the oldest group (transformed data: M = 0.89, SD = 0.14; untransformed data: M = 8.32, SD = 2.65) produced taller drawings overall than the youngest age group (transformed data: M = 0.81, SD = 0.22; untransformed data: M = 7.72, SD = 4.04). There were no significant differences between drawing height from the middle age groups compared to the other two groups.

A third main effect was found for condition ($F (2, 240) = 15.53$, $p < 0.001$; partial eta $^2 = 0.15$, $P = 1.00$). *Post hoc* Tukey tests showed that the drawings in the man (transformed means: M = 0.89, SD = 0.17; untransformed means: M = 8.53, SD = 3.07) and tree (transformed means: M = 0.89, SD = 0.15; untransformed means: M = 8.75, SD = 3.22) conditions were significantly taller than the drawings in the dog condition (transformed means: M = 0.75, SD = 0.19; untransformed means: M = 6.31, SD = 3.04) ($p < 0.001$). No other significant main or interaction effects were found for drawing height.

The numbers of children who increased the height of the nice drawings and reduced the height of the nasty drawings relative to baseline drawing size were calculated. 65.9% (N = 170) of the children increased the height of the positively characterised drawings compared to the baseline drawing, and 55.8% (N = 144) of the children reduced the height of the negatively characterised drawings from baseline drawing size.

Width

The transformed width was also analysed using a 3 (age group) x 2 (sex) x 3 (condition) x 3 (drawing type) four-way mixed ANOVA, with repeated measures on the factor of drawing type and independent groups on the other three factors. A main effect of drawing type was found ($F (2, 480) = 15.83$, $p < 0.001$). The effect size was medium, with high power (partial eta $^2 = 0.06$, $P = 1.00$). Simple planned contrasts showed that the nice drawings (transformed data: $M = 0.79$, $SD = 0.22$; untransformed data: $M = 7.03$, $SD = 3.61$) were wider than both the baseline drawings (transformed data: $M = 0.75$, $SD = 0.22$; untransformed data: $M = 6.40$, $SD = 4.10$) and the nasty drawings (transformed data: $M = 0.72$, $SD = 0.23$; untransformed data: $M = 6.06$, $SD = 3.17$) ($p = 0.030$), but baseline drawings were not significantly wider than nasty drawings.

A main effect of condition was also found ($F (2, 240) = 59.31$, $p < 0.001$; partial eta $^2 = 0.33$, $P = 1.00$). *Post hoc* Tukey tests revealed that the dog drawings (transformed data: $M = 0.90$, $SD = 0.17$; untransformed data: $M = 8.65$, $SD = 2.78$) were significantly wider than the man (transformed data: $M = 0.63$, $SD = 0.17$; untransformed data: $M = 4.81$, $SD = 2.59$) and tree (transformed data: $M = 0.74$, $SD = 0.15$; untransformed data: $M = 6.06$, $SD = 2.20$) drawings ($p < 0.001$), and that the trees were significantly wider than the men ($p < 0.001$). No further significant main or interaction effects were found for width.

Analysis of the frequencies of drawing size changes revealed that 59.7 % ($N = 154$) of the children increased the width of the nice drawings relative to their baseline drawings, while 52.7 % ($N = 136$) reduced the size of their nasty drawings relative to baseline.

Affect ratings of the characterised topics

In order to assess whether children exhibited different affect towards the characterised topics, the data from the affect rating scale were analysed using a 3 (age group) x 2 (sex) x 3 (condition) x 3 (drawing type) four-way mixed ANOVA, with repeated measures on the

factor of drawing type and independent measures on the other three factors. A main effect of drawing type was found ($F (1, 240) = 9834.14$, $p < 0.001$). This was a large effect with high power (partial eta $^2 = 0.98$, $P = 1.00$). Simple planned contrasts revealed that significantly ($p = 0.001$) higher affect was displayed towards the nice topic ($M = 4.83$, $SD = 0.40$) than the nasty topic ($M = 1.17$, $SD = 0.39$). A main effect of sex was also found ($F (1, 240) = 5.11$, $p < 0.05$), with a medium effect and relatively high power (partial eta $^2 = 0.02$, $P = 0.62$). *Post hoc* independent and paired t-tests showed that girls gave higher ratings ($M = 3.03$, $SD = 0.28$) than boys ($M = 2.96$, $SD = 0.29$) overall ($p = 0.009$).

A significant interaction between condition and drawing type was also found ($F (2, 240) = 12.72$, $p < 0.001$). *Post hoc* Tukey tests revealed that ratings of the nasty tree ($M = 1.07$, $SD = 0.25$) were significantly lower than ratings of the nasty man ($M = 1.28$, $SD = 0.50$) ($p = 0.01$), and that ratings of the nice dog ($M = 4.93$, $SD = 0.26$) and nice tree ($M = 4.85$, $SD = 0.36$) were significantly higher than ratings of the nice man ($M = 4.69$, $SD = 0.51$) ($p = 0.012$). No other significant main or interaction effects were found.

INSERT FIGURE 4 ABOUT HERE

Drawing ability

The data on the children's drawing ability provided by the class teachers were submitted to a 3 (age group) x 2 (sex) x 3 (condition) three way simple factorial ANOVA. No main or interaction effects were found. Thus, the allocation of participants to cells in the experimental design was not biased in terms of the children's drawing ability.

Discussion

Representational size change

This experiment provides clear evidence for the existence and measurability of representational size change following affective topic characterisation. In line with previous studies (e.g. Aronsson & Andersson, 1996; Cleeve & Bradbury, 1992; Craddick, 1961; Di Leo, 1973; Hulse, 1951; Sechrest & Wallace, 1964; Solley & Haigh, 1957), the findings show that, under the present conditions, children consistently increase the size of their drawings from baseline control drawings following a positive characterisation (in their surface area, height and width), and decrease the size of their drawings from baseline control drawings following a negative characterisation (in their surface area and height, although not in their width). The present findings therefore support the long-standing idea that the affective characterisation of a topic can influence the size of children's drawings, contrary to the conclusions of Jolley (1995) and Thomas & Jolley (1998).

Furthermore, these changes occur irrespective of whether the topic is a man, a dog or a tree. This contrasts with the results of Thomas et al.'s (1989) studies. The present findings suggest that the asymmetry of the findings obtained by Thomas et al. across their two experiments was probably not due to either topic animism or topic humanism, but to the methodological differences between the two experiments. All of the main effects of condition in the present study (i.e. drawing a man vs. a dog vs. a tree) are explicable in terms of the objective differences between the sizes of the three models that the children were given to draw.

The fact that there were no main or interaction effects involving the counterbalancing order in which the nice and nasty drawings were administered undermines the potential criticism that the present findings are an artefact of the repeated measures design. Hammer & Kaplan (1964) have shown that children who produce small (or large) human figure drawings in their first drawing tend to produce figures of an opposite size in their second drawing, and indeed, other studies have suggested that the reliability of children's human figure drawing

size is low (Jolley, 1995; Swensen 1968). However, this potential impact of order was examined explicitly in the present study by counterbalancing the order of the two affectively characterised drawing tasks, and by examining whether the order of administration impacted upon the children's drawings. No effects involving order of administration were found.

The measure of the children's affect towards the drawing topic, which was taken immediately after drawing completion, showed that the children did indeed rate the topics following affective characterisation in the anticipated directions. However, no measure of the children's feelings towards their drawings was taken at the actual time of drawing, for example using physiological measures, and it might be interesting to do so in order to confirm the presence of differential affect towards the topic at the time of drawing production. The use of a physiological measure would be a more direct measure of the child's feelings during drawing execution than the presently employed rating scales, as it is possible that other factors could influence ratings (e.g. children may give a low rating to a negative character because they have been taught that nasty people are bad, rather than because they feel negatively about the topic whilst drawing it). In addition, the present experiment utilised pre-drawn and rather unusual models, completed under a specific set of tightly controlled conditions (for the reasons given in the Introduction to this paper). It would be interesting to ascertain whether these effects of affective characterisation occur when more naturalistic models are involved, or when spontaneous drawings are produced in the absence of a model. To assess whether positive and negative emotions actually need to be present at the time of drawing for potential mechanisms to be activated, future research could also examine children who have pre-existing emotions about real events (a line of enquiry suggested by Thomas & Jolley, 1998; cf. Joiner et al., 1996, and Jolley & Vulic-Prtoric, 2001) to compare with the current findings. There may be limits to the generalisability of the findings obtained

in the present study. Such research is clearly required in order to assess whether these effects do indeed occur under other drawing conditions.

Developmental trends and gender differences

It is noteworthy that, in the present study, there were no interaction effects between age group and drawing type. This is despite the wide age range (4-11 years) which was employed in the present study. This finding implies that, if appetitive-defensive mechanisms are responsible for drawing size changes, then they operate in a similar manner across this entire age range. Alternatively, if pictorial conventions are responsible for these effects, then the lack of a developmental pattern suggests that the conventions are acquired before the age of 4. It would be interesting to sample younger and older children than those tested in the present experiment to assess the presence of any developmental trends outside this age range.

Overall, the oldest group did draw taller and larger drawings than the youngest group. Thus, the present findings run counter to the standard finding that children's drawings become smaller with age (Cox, 1992, 1993; Lange-Kuttner, 1997). Effects involving gender were also found. Boys drew larger nice drawings than the girls. Gender differences have not been addressed by previous work in this area (Jolley, 1995; Thomas et al., 1989). There is evidence to suggest that girls and boys exhibit differences in the way they draw, particularly in the ways they depict human figures (see Arazos & Davis, 1989; Cox, 1992; Koppitz, 1968; Sitton & Light, 1992), in the sex of human figures they choose to draw (Levick, 1997; Silver, 1996), and in the themes they represent (Malchiodi, 1998). Children's drawing figure height has been studied examining interactions with gender (Arazos & Davis, 1989; Sitton & Light, 1992), but little attention has been given to the measurement of surface area of children's drawings interacting with these factors. Girls may adopt more sophisticated and controlled drawing techniques in relation to emotional character than boys (Papadakis-Michaelides,

1989; Willsdon, 1977). Hammer (1997) presents evidence suggesting that girls draw in a more controlled manner than boys at most ages. If the boys were drawing in a less controlled manner than the girls, this may have resulted in the production of larger drawings due partly to the reduced level of production control involved. Further work monitoring children's graphic sequencing (Trautner, 1995, 1996) is needed to assess this possibility.

Implications for practitioners

This study does provide empirical support for the view adopted by some clinical and educational practitioners (Di Leo, 1973; Hammer, 1997) that the size of depicted objects in children's drawings can be interpreted as an index of the emotional significance of those objects for the children concerned. However, it is necessary to be cautious at this stage concerning the potential applications of this finding, due to the special conditions under which this effect was obtained in the present study. As noted already, the present experiment utilised pre-drawn and very unusual models, and the drawings were completed under a specific set of conditions. Caution is also required given the negative findings that were obtained by Joiner at al. (1996) and Jolley & Vulic-Prtotic (2001) using clinical populations and other groups where pre-existing affect might have been expected to be present. In order to establish the broader utility of the present findings for practitioners, it is essential to conduct further studies to ascertain whether these effects of affective characterisation also occur: (a) when more naturalistic models are involved; (b) when spontaneous drawings are produced in the absence of a model; and (c) when children from special (as opposed to mainstream) populations produce drawings.

That said, however, an examination of the frequencies with which the children altered the sizes of their positively and negatively characterised drawings does give an approximate indication of what might be expected of drawings which are produced by 4-11year old

children under the present specific conditions. In relation to topics which have been given a positive emotional character, practitioners can expect to see the majority of children drawing larger, taller and wider drawings, while in relation to topics which have been given a negative emotional character, they can expect to see the majority of children reducing the surface area and the height of the drawn topic, relative to a neutral baseline.

Theoretical interpretations

As Thomas & Jolley (1998) indicate, the interpretation of size changes in children's drawings is a complex process, as a reduction or an increase in the size of a feature may be a positive sign in one child's drawings and a negative sign in the next child's drawing of the same topic. However, the existing literature (Jolley, 1995; Fox & Thomas, 1990; Thomas et al., 1989) provides two theoretical possibilities as to why drawing size may be affected by topic characterisation. On the one hand, children may be responding using an acquired pictorial convention according to which larger figures represent nice characteristics and smaller figures represent nasty characteristics. On the other hand, children may be responding using an appetitive mechanism which serves to increase the size of nice topics in order to achieve psychological affinity with such topics, and a defensive mechanism which serves to decrease the size of nasty topics in order to reduce the perceived threat of the drawn figure and to increase psychological distance from such a figure.

The results obtained in the present study may be construed as fitting either interpretation. One problem with the pictorial convention explanation, however, stems from Jolley's (1995) finding that, during drawing perception tasks (as opposed to drawing production tasks), children identify small figures as nice characters and large pictures as nasty characters. This is the opposite pattern to that found in children's production of positively and negatively characterised figures in their drawings. As it is unlikely that

opposite pictorial conventions should apply in drawing perception and drawing production, the present findings are probably more convincingly explained by the appetitive-defensive account. However, it should be borne in mind that the affect measure used in the present study does not provide unambiguous evidence that real emotion was actually present at the time of drawing production. Further research (which probably also needs to include both picture perception and production tasks) is therefore required to assess whether or not the presence of emotion is required for the activation of this hypothesised appetitive-defensive mechanism.

Conclusions

This experiment has shown that, under the present conditions (in which copies of two-dimensional pre-drawn models are produced, and planning difficulties and production problems are eased), children do produce larger drawings of positive topics than of neutral topics (in surface area, height and width), and smaller drawings of negative topics than of neutral topics (in surface area and height). This response pattern is not stimulus-specific, is not related to topic animism or humanism, and tends to occur in all children between 4 and 11 years of age. While the precise nature of the mechanisms which are responsible for these effects remains elusive, this experiment has provided evidence that, contrary to the assertions of some recent researchers, size changes in relation to affective characterisation do sometimes occur. It remains unclear, however, why these size occur in some situations but not in others; further research is required in order to address this issue.

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Table 1: Mean ages and age ranges of children in each age group in each condition

		Age Group	
Condition	*Youngest (N = 111)*	*Middle (N = 74)*	*Oldest (N = 73)*
Man (N = 86)	N = 36 Mean = 6y 2m Range = 4y 4m - 7y 5m	N = 25 Mean = 8y 6m Range = 7y 7m - 9y 5m	N = 25 Mean = 10y 7m Range = 9y 7m - 11y 10m
Dog (N = 85)	N = 37 Mean = 6y 3m Range = 4y 6m - 7y 6m	N = 24 Mean = 8y 7m Range = 7y 8m - 9y 6m	N = 24 Mean = 10y 6m Range = 9y 7m - 11y 11m
Tree (N = 87)	N = 38 Mean = 6y 1m Range = 4y 5m - 7y 6m	N = 25 Mean = 8y 6m Range =7y 7m - 9y 6m	N = 24 Mean = 10y 6m Range = 9y 8m -11y 11m
Grand Means	Mean = 6y 2m Range = 4y 4m -7y 6m	Mean = 8y 6m Range = 7y 7m -9y 6m	Mean = 10y 6m Range = 9y 7m - 11y 11m

Table 2: The mean transformed (in standard typeface) and untransformed (in bold typeface) surface area scores for each drawing type, broken down by gender (SD = standard deviations).

		Gender	
Drawing Type	*Boys (N=134)*	*Girls (N=124)*	*Grand Means (N=258)*
Baseline	1.84 (SD=0.39) **25.15 (SD=27.10)**	1.79 (SD=0.35) **20.90 (SD=18.51)**	1.82 (SD=0.37) **23.11 (SD=23.42)**
Nice	2.00 (SD=0.45) **43.25 (SD=57.22)**	1.85 (SD=0.37) **24.48 (SD=22.60)**	1.93 (SD=0.42) **34.23 (SD=45.02)**
Nasty	1.75 (SD=0.44) **24.46 (SD=43.60)**	1.74 (SD=0.39) **18.89 (SD=16.91)**	1.75 (SD=0.42) **21.78 (SD=33.42)**
Grand Means (N=258)	1.86 (SD=0.37) **30.96 (SD=35.91)**	1.80 (SD=0.34) **21.42 (SD=16.38)**	1.83 (SD=0.35) **26.37 (SD=28.61)**

Figure 1: Likert scale used to assess children's affect towards the characterised topics.

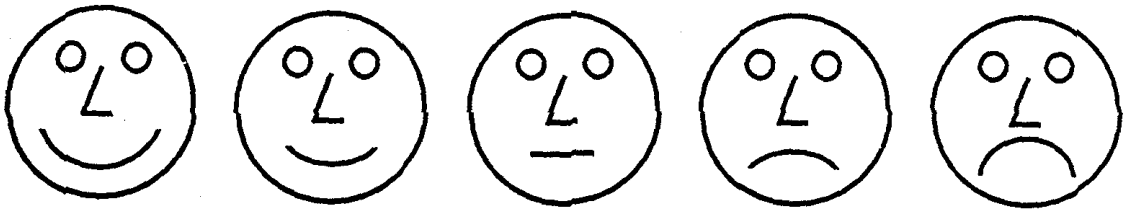


Figure 2: The models used in this experiment.

Figure 3: Mean transformed surface area (cm^2) for each drawing type for boys and girls

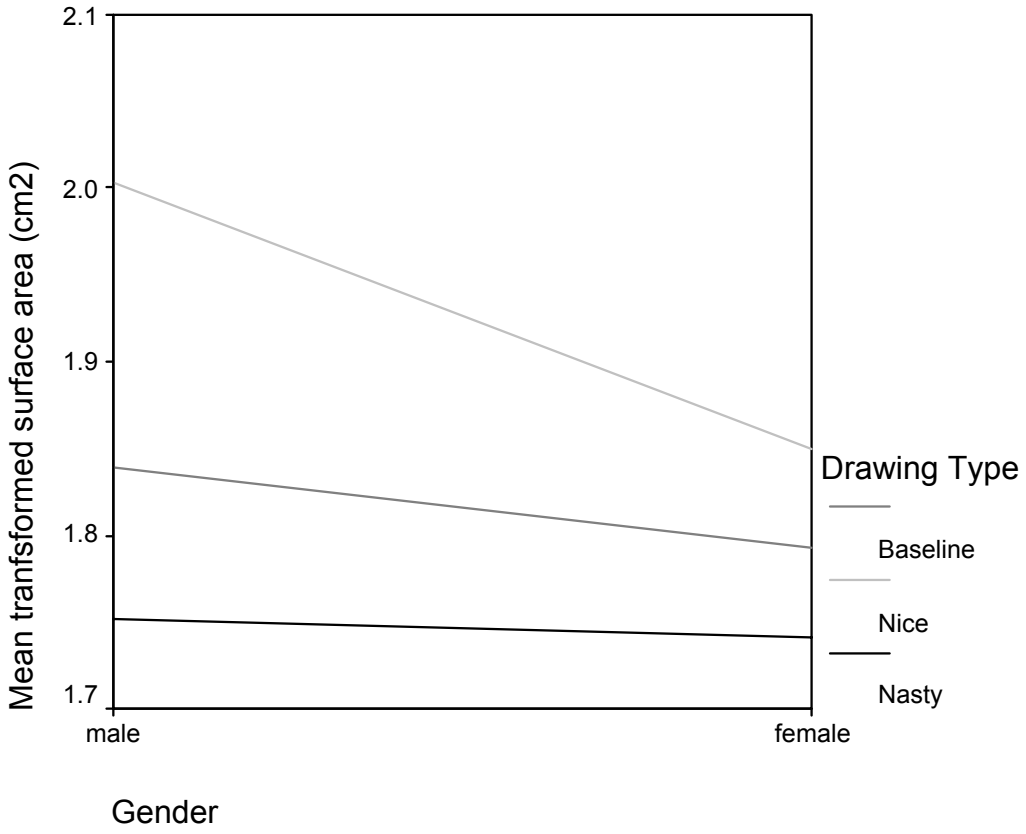
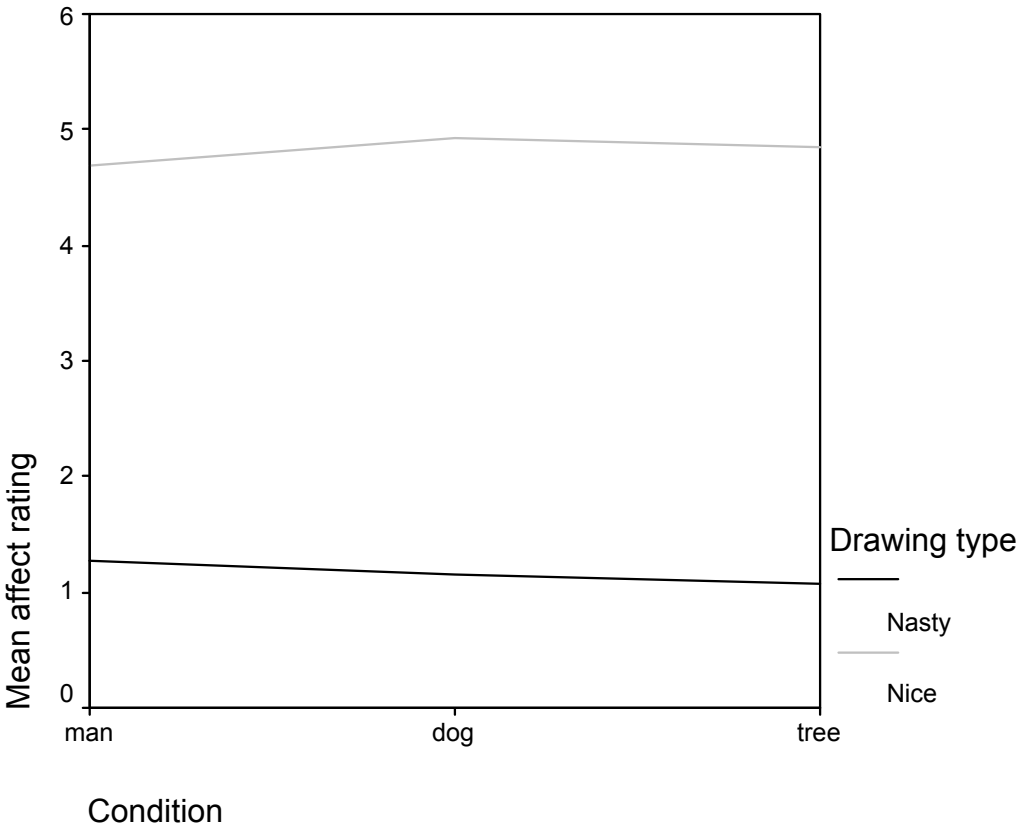


Figure 4: Mean affect scores for each condition


6
5
4
3
2
1
0
Mean affect rating
man
dog
tree
Condition
Drawing type
Nasty
Nice